FRD Activities Report
October 1999

Research Programs

Hurricane Balloons

The development of version three of the FRD smart balloon continues. NOAA funding is being used to develop smart balloons that will monitor conditions inside hurricanes. To control the altitude on a smart balloon, it is necessary to use a valve to release the ballast air from the pressurized air ballast bladder. Since it takes a large volume of air to make a change in the balloon weight, it is important to have an efficient valve to release the air. In the past, a modified screw-operated hose clamp with a low speed motor/gearbox was used to open and close the air flow in a rubber hose. This has worked well but is limited in hose diameter and is not as rugged as desired (see associated pictures). The new valve will work on any diameter tubing, is simple to build and rugged. Note that as the slider clamps in the final portion of the lever swing, the mechanical advantage is greatest to ensure total seal of the rubber hose. A resistor-in-series limits current with the solid state drivers that control the direction (open or closed) of the drive motor. The current required to operate the new valve is 10 to 20 mA at 5 volts.

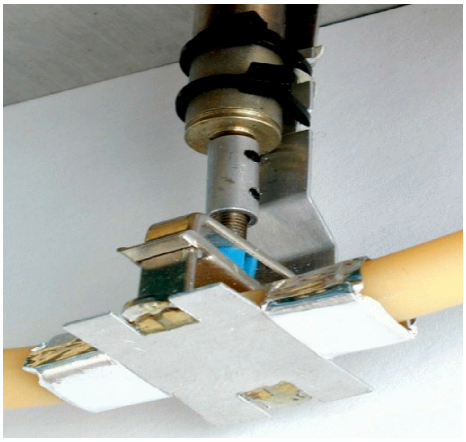

Fig.1. Old ballast air release valve.

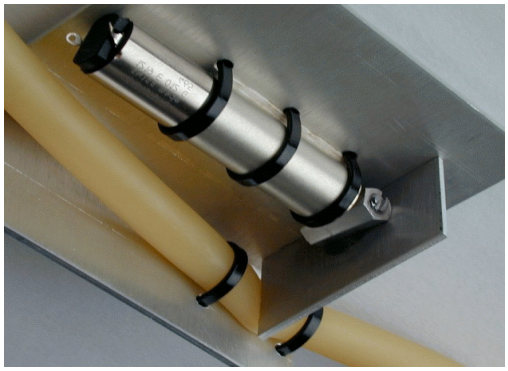

Fig. 2. Redesigned air release value.

The smart balloons use a lot of battery power to operate the GPS receiver, ballast pumps, micro controller and valves. It is also necessary to test each smart balloon transponder in the lab to ensure that everything operates as it should prior to field deployment. In the past, we have

constructed the battery packs from 40 AA one-time use lithium batteries. These batteries are expensive, require a substantial amount of labor to fabricate and can only be used one time. For the hurricane balloons, we have purchased and tested rechargeable lithium ion battery packs that are designed for use in notebook computers. The cost is about the same without the need to build the packs up from many individual batteries and can be recharged while inside the transponder after lab testing is complete. We will also be able to charge these batteries while we are preparing and testing the transponders prior to launch. Each battery pack also includes a 5 level LED visual display showing the level of the battery charge when a button is pushed on the battery pack.

Fig. 3. New Lithium Ion Rechargeable Battery (14.8 volt, 5100 mAh).

Initial testing of the new smart balloon micro computer has been completed. All of the digital and analog input/output functions have been tested and interface software for the hardware interfaces developed. Programming has proven to be simpler than expected. Development of the actual balloon controller application will begin next month. (Randy.Johnson@noaa.gov, Roger Carter)

Final Preparations for SHOWEX

Final preparations were completed for the participation of the LongEZ in SHOWEX. Major work focused on continuing tests and calibrations to assure proper operation of the instruments and data acquisition system. In addition, the data acquisition and post-processing software packages that are to be used for this experiment were updated to provide a more robust system than in previous field campaigns. FRD scientists continue to work closely with ATDD scientists Ed Dumas and Rick Eckman as the MFP system continues to evolve. The LongEZ will be flown out of First Flight Airport in Kill Devil Hills from November 10 to December 10. (Jerry.Crescenti@noaa.gov, Jeff French, Tim Crawford).

BRAVO

The BRAVO project was terminated on November 1, 1999. All four release systems were turned off at 08:00 am. The release data is now in the review process. (Dianne.Hoover@noaa.gov).

AFTAC 2000

The successful completion of the 1999 AFTAC project has led to a request by the AFTAC program manager to conduct a similar project next year. This particular group of AFTAC personnel are stationed at Patrick AFB in Florida and are concerned with non-proliferation and anti-terrorism programs. (Kirk.Clawson@noaa.gov)

Cooperative Research with INEEL

Jackson Hole, WY, Residents Protest Permitting of AMWTF

An open house at the Jackson High School was held on Saturday, October 23. The open house was sponsored by DOE to help inform the public of the risks associated with the Advanced Mixed Waste Treatment Facility (AMWTF). AMWTF has been selected by the DOE to be the process for minimizing and disposing of mixed waste stored at the INEEL. The mixed waste contains both toxic chemicals and radioactive materials primarily from the Rocky Flats arsenal near Denver, CO. AMWTF will consist of both a compressing facility and an incinerator. Some Jackson Hole residents, lead by attorney Gerry Spence and the Keep Yellowstone Nuclear Free Coalition, have expressed concern that the burning of radioactive waste will bring harmful radiation doses to their valley. However, radioactive releases from the facility are planned to be only a small part of the total INEEL annual emissions. In addition, Jackson is located some 100 miles to the east of the proposed facility and this distance is separated by a 13,000 ft. mountain barrier.

DOE-Idaho invited a representative of FRD to attend the open house to discuss INEEL meteorology. The FRD display consisted of a Microsoft Powerpoint presentation and posters describing the FRD mission for DOE-ID, the local surface wind fields, and modeling efforts using MDIFF. Copies of the INEEL Climatology (a FRD publication) were also distributed.

Only about 80 people attended the seven-hour open house. For the most part, the attendees were friendly and open-minded. Several interesting discussions ensued. Contacts were also made with local Forest Service personnel and an invitation was extended to have FRD become a part of the Greater Yellowstone Area Clean Air Partnership. A meeting of the GYA-CAP will be held next month and FRD was invited to give a presentation at that meeting. In addition, a followup meeting was held with the DOE-ID manager to discuss the Jackson issue and the results of the open house. This gave FRD the opportunity to meet the manager and discuss meteorological issues of concern and to propose a tracer study to quantify diffusion into Jackson Hole. (Kirk.Clawson@noaa.gov)

Coalition 21, a local non-profit organization who's motto is "Supporting Tomorrow's Technologies with Facts not Fears" requested FRD's comments on an article appearing in the Jackson Hole newspaper. The article was written by Jim Woodmency, a meteorologist with a Jackson Hole radio station. His article purported that wind patterns would bring nuclear pollution from the proposed waste incinerator at the INEEL to Jackson Hole. Our comments were that the incinerator plume would need to reach levels higher than 9,000 or 10,000 feet above sea level in order to escape the channeling effects of the surrounding mountains. At those levels the wind patterns could transport material toward Jackson Hole. Wind roses derived from pibals and the surface station were sent to document the flow patterns. (Jerry.Sagendorf@noaa.gov)

Automatic MDIFF Dispersion Forecast in Demand at INEEL

Progress on the development of a short term dispersion forecast for the INEEL has been included in several monthly reports. The forecast is provided by an historical pattern matching computer code that runs every 30 minutes in the FRD office. Researchers at the INEEL are now closely monitoring mercury effluent and quantifying the dispersion characteristics. They plan to use the dispersion forecast to measure mercury in downwind areas identified by the forecast immediately before and after storm passage this winter. Although the forecast is still in the developmental stages, it will likely prove to be a useful tool for purposes other than radiological effluent modeling. (Kirk.Clawson@noaa.gov, Roger Carter, Jerry Sagendorf)

Collaborative Sagebrush Steppe Ecosystem Carbon Balance Measurements

A year-round eddy correlation water vapor and carbon dioxide flux site is being established at the INEEL. Scientists from the USDA Agriculture Research Service are collaborating with FRD in a year-long measurement of the carbon balance of the local sagebrush steppe ecosystem. The ARS scientists this month installed a Bowen Ratio system to simultaneously measure water vapor and carbon dioxide along with the FRD eddy correlation system. These data will be useful both to NOAA scientists and ARS scientists, who have established a network of Bowen Ratio systems extending from Texas to Montana. (Kirk.Clawson@noaa.gov)

Emergency Operations Center Support (EOC)

On Oct. 6, 1999, the INEEL conducted an emergency response drill in preparation for the Annual Exercise that will be conducted on Nov. 3, 1999. Neil Hukari and Roger Carter staffed the two FRD positions at the Emergency Operations Center (EOC). The drill went very well as a whole and FRD has not received any suggestions for improvement of their performance. (Roger.Carter@noaa.gov, Neil Hukari)

The remodeling of the INEEL Emergency Operations Center (EOC) is essentially complete. FRD has been working with the emergency planning organization to complete installation of the necessary equipment. A dedicated data link between the FRD office and the EOC is scheduled to be installed on Nov. 2 and should be operational for the Nov. 3 Annual Exercise. This will provide FRD staff in the EOC with access to complete National Weather Service products through the Marta system and also the capability to access the INEEL mesonet data in a wide variety of formats. This should allow FRD to provide better, more efficient support in the EOC. (Roger.Carter@noaa.gov)

Interim Guidance for Dispersion Calculations

A memorandum was written to BBWI, the prime contractor at the INEEL, giving interim guidance for “worst case” dispersion calculations for the TAN area of the INEEL. (Jerry.Sagendorf@noaa.gov)

Monitoring and Surveillance Committee Presentations

The monthly meeting of the MSC was held on October 28th, with Kirk Clawson serving as committee chairman. Tom Watson gave a presentation "The Use of Intentionally Released Tracers to Quantify atmospheric Transport and Dispersion" and Randy Johnson gave a presentation " Evolution of Smart Balloons or How to Play With Balloons and Get Paid For It." A discussion on the use of tracers for answering the AMWTF effluent to Jackson Hole transport issue ensued. (Kirk.Clawson@noaa.gov, Tom Watson, Randy Johnson)

DOE Statement of Work

The current DOE Statement of Work is set to expire on November 30. A new draft statement of work was prepared and submitted to the DOE COR, Betsy Yonker. The SOW is similar to previous years'. However, additional effort to involve the Environmental Science and Research Foundation's two school meteorological towers in the Idaho Environmental Monitoring Program was included at the request of the COR. (Kirk.Clawson@noaa.gov)

Other Activities

50th Anniversary Celebration

November 1949 was the official beginning of the Field Research Division at Idaho Falls, Idaho. A 50th anniversary celebration and open house was held this month, in conjunction with a visit from ARL HQ by Bruce Hicks, to commemorate the occasion. Displays highlighting our history, current capabilities, and future Small Environmental Research Aircraft plans, as well as a buffet were prepared our guests. The open house was heavily attended by personnel from DOE-ID, BBWI (the INEEL contractor), the media, and former employees. The noon weather for Channel 3 TV was broadcast from our forecast center. Among the dignitaries who attended were Bruce Hicks ARL Director and Ray Dickson, a former FRD Director for 29 years. For more information, see the web page at http://www.noaa.inel.gov/news/Anniversary.html. (Kirk.Clawson@noaa.gov and staff)

Newest FRD employee, Jeff French, with 50th anniversary cake.

AMS Nominations

The AMS Measurements Committee, chaired by Jerry Crescenti, has submitted nominations for the Remote Sensing Lecturer and the Walter Orr Roberts Lecturer in Interdisciplinary Sciences. The Measurements Committee has nominated Dr. William D. Neff of NOAA's Environmental Technology Laboratory for the Remote Sensing Lecturer and Dr. Robert A. Weller of the Woods Hole Oceanographic Institution for the Walter Orr Roberts Lecturer in Interdisciplinary Sciences. The Remote Sensing Lecturer is selected in recognition of sustained, outstanding contributions to passive and active remote sensing of the atmosphere or oceans. The lecture is presented at one of the following conferences: Radar, Satellite, Laser, Atmospheric Radiation, and/or Measurements depending on the Lecturer and topic. The Walter Orr Roberts Lecturer in Interdisciplinary Sciences is selected in recognition of significant contributions to the understanding of atmospheric processes derived from multi-disciplinary research activities. The purpose of the lectureship is to foster interchange of knowledge between atmospheric scientists and persons in other disciplines. The lecture is presented at the AMS Annual Meeting or an appropriate specialized conference. Both lectures are published in the Bulletin of the AMS. (Jerry.Crescenti@noaa.gov)

Papers

Clawson, K. L., J. F. Sagendorf, and R. G. Carter, 2000: Comparisons of a puff trajectory model with real time tracer measurements. Preprint, 11th Joint Conference on the Applications of Air Pollution Meteorology with the Air & Waste Management Association, Long Beach, CA, Jan. 9-14, Amer. Meteor. Soc. Submitted to AMS.

Papers Reviewed

Tucker, D. F., and G. A. Marotz, 1999: Meteorological Conditions for Minimizing the Spread of Material in a Combustion Plume. Submitted to the *Journal of Applied Meteorology*, reviewed by Jerry Crescenti.

Visitors

Dr. Doug Johnson and Nick Saliendra of the USDA-ARS at Utah State University in Logan, UT and Dave Swanson of the USDA-ARS Sheep Experiment Station in Dubois, ID visited FRD on October 25 and 27 to install a Bowen Ratio energy balance system (see article).